

C-A OPERATIONS PROCEDURE MANUAL

C-A TPL 03-01 TEMPORARY PROCEDURE TO ENSURE COMPLIANCE WITH THE BAF ENERGY-FLUX ASE

Text Pages 2 through 6

Hand Processed Changes

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C-A TPL 03-01 TEMPORARY PROCEDURE TO ENSURE COMPLIANCE WITH THE BAF ENERGY-FLUX ASE

1. Purpose

- 1.1 The purpose of this procedure is to provide instructions to MCR staff to limit particle energy-flux during BAF operations in order to comply with the Beam Intensity Operational Safety Limits (OSL) found in C-A OPM 2.5.3 BAF Accelerator Safety Envelope Parameters.

The Beam Intensity Operational Safety Limits are:

- The annual limit on the (product of) number and energy of nucleons extracted from the BAF SEB system shall not exceed 10^{17} GeVnucleons.
- The annual limit on the (product of) number and energy of nucleons deposited on the BAF beam dump shall not exceed 3×10^{16} GeVnucleons.
- The hourly limit on the (product of) number and energy of nucleons extracted from the BAF SEB system shall not exceed 6×10^{14} GeVnucleons.
- The hourly limit on the (product of) number and energy of nucleons entering the BAF target room and beam stop system shall not exceed 6×10^{14} GeVnucleons

2. Responsibilities

- 2.1 The Operations Coordinator is responsible for the execution of this procedure. The OC is also responsible for making changes to the BAF_ASE GPM whenever the species and/or energy of the accelerated ions changes.
- 2.2 MCR Operators are responsible for monitoring the Alarm Display Task (ADT).
- 2.3 The MCR Group Leader, or his designate, is responsible to ensure a Logger is running to track the Booster “xcbm” on the appropriate user in order to provide backup if the BAF_ASE GPM acquires bad data.
- 2.4 The Liaison Physicist is responsible for explaining to the users the necessity for periodic checks of beam transport efficiency.

3. Prerequisites

- 3.1 The JEFF(2) server or equivalent application server must be running to generate GPM alarms.
- 3.2 The BAF_ASE GPM is operational
- 3.3 The Booster Circulating Beam Current Transformer is Operational
- 3.4 Alarm Display (AGS) must be running to display GPM alarms.
- 3.5 The target group for this procedure is the BAF Commissioning team Leader, MCR Operators and Operations Coordinators (OC), and the MCR Group Leader.
- 3.6 The training requirement for this procedure is read and sign.
- 3.7 The minimum number of staff members that need to be trained in order for this procedure to be effective is three, one BAF Commissioning team leader, one OC and one operator.

4. Precautions

- 4.1 The beam instrument available to support this procedure is the Booster Circulating Beam Current Transformer (CBM). **ALL** alarms will be derived based on the sum over time of the readings of the CBM taken at the start of slow extraction.

5. Procedure

5.1 Required software tools

- 5.1.1 Verify that JEFF server, ADT, and the watchdog /GPM/Jeff/BAF_ASE.mon are running whenever BAF is running.
- 5.1.2 The MCR Group Leader (MCRGL) shall ensure that a logger is running to monitor the booster xcbm on BAF cycles in order to provide backup in case the BAF_ASE GPM acquires bad data.
- 5.1.3 Daily, the DAY SHIFT OC shall look at a BAF_ASE GPM display on a video monitor to verify that the application is using the correct ion species and energy for its accounting.

5.2 Required Instrumentation

- 5.2.1 The booster circulating beam current transformer must be operational whenever BAF is running

5.3 BAF Operation

5.3.1 Species or Energy change

- 5.3.1.1 IF the species or ion extraction energy is changed, THEN the OC shall edit the parameter list for the BAF_ASE GPM – see paragraph 5.4.
- 5.3.1.2 The OC shall stop and start the BAF_ASE server to pick up the change

5.3.2 Hourly Limits

Note 1:

IF 50% of the hourly limit for a parameter is exceeded, THEN a level III alarm will appear on the AGS ADT display. These alarms serve as a warning. The alarms are:

JEF.BAF_EXTR_HRLY_TOT	range error	(for BAF Extraction and)
JEF.BAF_TARGET_RM_HRLY	range error	(for the BAF Target Room)

- 5.3.2.1 IF you see a level IV JEF.BAF_EXTR_HRLY_TOT range error alarm on the ADT, THEN 90% of the hourly limit for BAF extraction has been exceeded.

- 5.3.2.1.1 Verify, by looking at the BAF_ASE gpm that the limit is not >> 100% of the hourly limit. IF the alarm is >>100% of the hourly limit, then go to paragraph 5.3.4.

- 5.3.2.1.2 The OC shall inform the BAF Liaison Physicist and curtail the program if instructed to do so.

- 5.3.2.2 IF you see a level IV JEF.BAF_TARGET_RM_HRLY range error alarm on the ADT, THEN 90% of the hourly limit for beam in the BAF target room has been exceeded.

- 5.3.2.2.1 Verify, by looking at the BAF_ASE gpm that the limit is not >> 100% of the hourly limit. IF the alarm is >>100% of the hourly limit, then go to paragraph 5.3.4.

5.3.2.2.2 The OC shall inform the BAF Liaison Physicist and curtail the program if instructed to do so.

5.3.3 Yearly Limits

Note 2:
NO 50% ALARMS WILL BE GENERATED FOR YEARLY PARAMETER LIMITS

5.3.3.1 IF you see a level IV JEF.BAF_EXTR_YTD_TOT range error alarm on the ADT, THEN 90% of the YEARLY limit for BAF extraction has been exceeded.

5.3.3.1.1 Verify, by looking at the BAF_ASE gpm that the limit is not >> 100% of the yearly limit. IF the alarm is >>100% of the yearly limit, then go to paragraph 5.3.4.

5.3.3.1.1 The OC shall inform the BAF Liaison Physicist and curtail or stop the program if instructed to do so.

5.3.3.2 IF you see a level IV JEF.BAF_BEAM_STP_YTD range error alarm on the ADT, THEN 90% of the YEARLY limit for beam in the BAF beam stop has been exceeded.

5.3.3.2.1 Verify, by looking at the BAF_ASE gpm that the limit is not >> 100% of the yearly limit. IF the alarm is >>100% of the yearly limit, then go to paragraph 5.3.4.

5.3.3.2.1 The OC shall inform the BAF Liaison Physicist and curtail or stop the program if instructed to do so.

5.3.4 Problems with the BAF_ASE GPM

Note 3:

“Non-physical” measurements may add incorrect data to the integrated total which operations uses to regulate the amount of beam dumped and stay under OSLs outlined in this procedure.

In order to stay in compliance with this procedure, calculation of the beam that was extracted prior to the incorrect data point must be made, and then added to that calculated after the integration has been reset by stopping and starting the gpm.

By observing a plot of the booster current transformer at extraction for the last hour, one must calculate BAF extracted beam totals and therefore stay within limits by adding previous totals to new totals .

Note 4:

Incorrect data is defined as a pulse that reads greater than 1E14 on the booster current transformer sampled at extraction on the appropriate booster user.

5.3.4.1 IF an incorrect data point is observed THEN:

Note 5: Be sure the arithmetic is done in the same (nucleon) units

- 5.3.4.1.1 Calculate the last hour's BAF extracted beam by integrating points using the BAF_ASE logger (LogView)
- 5.3.4.1.2 Use these as representative hourly totals and follow this procedure
- 5.3.4.1.3 Stop and start BAF_ASE gpm, which will reset the totals
- 5.3.4.1.4 After 20 minutes of running, recalculate the old total for 40 minutes and add this to the newly integrated totals
- 5.3.4.1.5 Use these new numbers as representative hourly totals and follow this procedure
- 5.3.4.1.6 Repeat 5.3.4.1.4 and 5.3.4.1.5 above, subtracting 20 minutes from the old total each time, and adding 20 minutes to the new total each time until an hour has passed
- 5.3.4.1.7 After an hour has passed, respond to dumped beam totals as displayed by BAF_ASE.

5.4 Editing the BAF_ASE parameter list before a species/energy change.

- 5.4.1 Run Gpm
- 5.4.2 Choose "Edit Cellfiles" from the Cellfiles menu on the Gpm menubar
- 5.4.3 Choose "CellFiles" from the *Select tree branch* (left) window.
- 5.4.4 Choose OC_CELLS from the CellFiles branch
- 5.4.5 Choose BAF_ASE.cells from the *Select Gpm file* (right) window.
- 5.4.6 Choose OK
- 5.4.7 IF you are changing ion species THEN, delete the # sign from the **CELL BAF_SPECIES=** line for the species you will deliver.
- 5.4.8 IF you execute the previous step THEN, add the # sign to the **CELL BAF_SPECIES=** line for the species that will no longer be delivered
- 5.4.9 IF you are changing Booster extraction energy for BAF THEN, change the number (units = GeV) in the line **CELL BAF_KINETIC_ENGY=**.
- 5.4.10 Choose "Save" from the "File" menu on the menubar

- 5.4.11 Verify that the BAF_ASE watchdog has incorporated the changes by using Gpm to:
 - 5.4.11.1 Choose MCR from the GPM Monitor Tree
 - 5.4.11.2 Choose BAF_Ops
 - 5.4.11.3 Choose BAF_ASE.mon in the right window
 - 5.4.11.4 Verify that the species that is displayed is correct
- 5.4.12 Restart the server (Jeff)
- 5.5 Control of Losses in the beam transport.
 - 5.5.1 The Liaison Physicist shall explain to the users the need for periodic checking of the beam transport efficiency
 - 5.5.2 The BAF operator shall check the beam transport efficiency at least once a day, whenever a convenient time arises between experiments.
 - 5.5.3 The BAF operator shall check the transport efficiency by inserting ion chambers in the upstream and downstream ends of the beam line and by measuring the transmission. IF the transmission is not as would be expected, THEN they shall tune the beam or ask the Liaison Physicist for assistance. Losses are to be kept as low as reasonably achievable.
- 6. Documentation
 - 6.1 None.
- 7. References:
 - 7.1 [C-A OPM 2.5.3 "BAF Accelerator Safety Envelope Parameters"](#)
- 8. Attachments:
 - 8.1 None